



DEPARTMENT OF THE INTERIOR

National Park Service

[NPS-WASO-GRD-22583; GPO Deposit Account 4311-H2]

Addition of Thermal Features within Valles Caldera National Preserve to the List of Significant Thermal Features within Units of the National Park System

AGENCY: National Park Service, Interior.

ACTION: Notice.

SUMMARY: This notice announces the addition of the thermal features within Valles Caldera National Preserve, New Mexico, to the list of significant thermal features within units of the National Park System under the Geothermal Steam Act. This designation will provide additional protection of these important thermal features, as well as opportunities for enhanced collaboration among Federal Agencies, scientists, and resource managers.

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SUPPLEMENTARY INFORMATION: On December 28, 2016, the National Park Service (NPS) published for public review and comment a proposal to add the thermal features within Valles Caldera National Preserve (Preserve), New Mexico, to the list of significant thermal features within units of the National Park System in accordance with the Geothermal Steam Act as amended (see 81 FR 95632 (Dec. 28, 2016)). During the public comment period, which closed on January 27, 2017, the NPS received comments from 65 individuals, American Indian tribes, and nongovernmental organizations. The purpose of this notice is to summarize the proposal, review the comments that the NPS received on the proposal, and update the list of park units containing significant thermal

features by adding the Valles Caldera to the list as a volcanic feature, and adding the hydrothermal system within the Preserve as a hydrothermal feature.

The Geothermal Steam Act (GSA), as amended, authorizes the Secretary of the Interior (Secretary) to issue geothermal leases for exploration, development and utilization of geothermal resources within available public lands administered by the Department, as well as on federal lands administered by the Department of Agriculture or other surface managing agencies, and on lands that have been conveyed by the United States subject to a reservation to the United States of the geothermal resources in those lands (30 U.S.C. 1002). The Bureau of Land Management (BLM) administers the geothermal resources program pursuant to its regulations at 43 CFR Parts 3000, 3200, and 3280. On federal lands managed by the Agriculture Department or used for a federal water power project, the BLM must first obtain the consent of the Secretary of Agriculture or Secretary of Energy, respectively, before it may issue any leases for geothermal resources underlying those lands (see 30 U.S.C. 1014(b)).

The GSA provides that lands administered by the National Park Service (NPS) are not subject to geothermal leasing, thereby prohibiting geothermal leasing and development in park units (*see* 30 U.S.C. 1002, 1014(c)). In addition, the Preserve has been expressly withdrawn from the operation of the geothermal leasing laws (16 U.S.C. 698v-11(b)(9)).

The GSA directs the Secretary to maintain a list of significant thermal features within units of the National Park System (see 30 U.S.C. 1026(a)(1)). The GSA specified sixteen park units already identified as containing such features for the list, and also authorized the Secretary to add significant thermal features within these or other park units to the list. 30 U.S.C. 1026(a)(2). Such a determination includes consideration of four significance criteria as well as a notice and public comment process (see 30 U.S.C. 1026(a)(2)-(3)). The NPS published its proposed notice for evaluation of the Valles

Caldera National Preserve and its thermal features under these significance criteria in the **Federal Register** on December 28, 2016, in compliance with the GSA process.

For listed significant thermal features, the GSA requires

- (1) The Secretary to maintain a monitoring program, including a research program carried out by NPS in cooperation with the U.S. Geological Survey (30 U.S.C. 1026(b));
- (2) the Secretary to determine, on the basis of scientific evidence, and subject to notice and public comment, whether exploration, development, or utilization of the land subject to a lease application would be reasonably likely to result in a significant adverse effect on any listed feature and, if so, not to issue the lease (30 U.S.C. 1026(c));
- (3) the Secretary to determine, on the basis of scientific evidence, whether the exploration, development, or utilization of the land subject to a lease or drilling permit is reasonably likely to adversely affect any listed features and, if so, to include stipulations in the lease or drilling permit to protect those features (30 U.S.C. 1026(d)); and
- (4) the Secretary of Agriculture to consider the effects on significant thermal features within units of the National Park System in determining whether to consent to leasing on national forest lands or other lands administered by the Department of Agriculture (30 U.S.C. 1026(e)).

Summary of NPS Proposal: In its December 28, 2016, notice proposing to add the Preserve, with its volcanic caldera and hydrothermal features (81 FR 95632), the NPS first described the relevant history of the GSA and the bases for previous listings of significant thermal features within park units (see 81 FR 95632). The NPS then proposed to define “thermal feature” as the surface manifestation of subsurface thermal resources, systems, or activity, and to use the words “hydrothermal” and “volcanic” as a simple description of the type of underlying thermal activity that resulted in how the feature appears on the earth’s surface.

The NPS also proposed to remain consistent with its previous significant thermal feature determinations by interpreting the GSA's four significance criteria as follows:

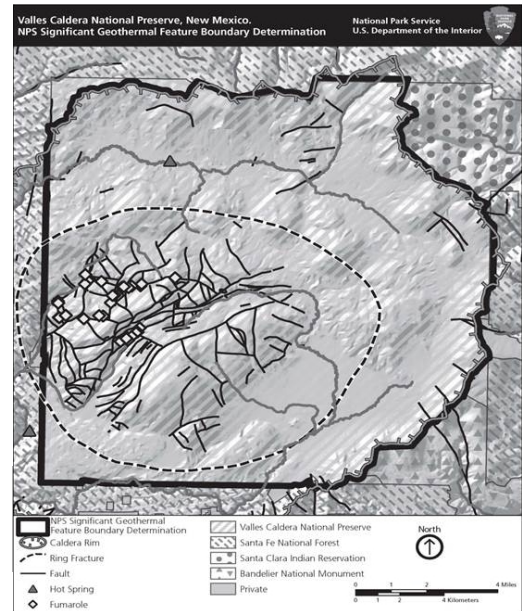
(1) *Size, extent, and uniqueness* -- NPS does not establish lower or upper limits on the size or extent of a feature. Each feature is identified according to its existing surface dimensions. For a feature to be considered significant under this criterion, it is identified as unique to the region, the nation, or, in some cases, the world.

(2) *Scientific and geologic significance* -- NPS considers the feature "significant" when the feature has been identified as contributing to geologic, biological, or other scientific knowledge compared with similar features in other areas or makes a significant contribution to the understanding of similar systems.

(3) *The extent to which such features remain in a natural, undisturbed condition* -
- Under this criterion, no limits are established for amount or degree of development. The feature may be significant if it remains in a natural, relatively undisturbed condition. Modifications or improvements may be acceptable if: the alterations were necessary to preserve a developed feature; modifications intended to accommodate or improve public enjoyment of the feature are judged to be consistent or compatible with the intent of the enabling legislation; and so long as disturbances or developments, if any, have not affected the subsurface thermal regime.

(4) *Significance of thermal features to the authorized purposes for which the park unit was created* -- NPS considers features significant if they were the basis for establishment of the unit (i.e., the feature was specifically identified in the enabling legislation) or if they are consistent with the statutory purposes for which the area was set aside.

The NPS then proposed to add two significant thermal features within the Preserve to the list. The first such feature was the vast majority of the caldera itself, as a single volcanic feature. Excepted from the proposal was the portion of the caldera (10-15%) that lies outside the Preserve's western and southern boundaries. The NPS also proposed to add various hydrothermal features within the Preserve to the list as a significant hydrothermal feature.



Summary of Comments Received on the Proposal

Sixty-five comments on the proposal were submitted to the NPS via the PEPC web site at <https://parkplanning.nps.gov/vallego>. The comments were submitted by 57 members of the public (mostly local or state residents), six New Mexico-based nongovernmental organizations, and representatives of two American Indian tribes located in northern New Mexico.

Sixty-four of the 65 commenters fully and enthusiastically supported the NPS proposal. Many of the commenters expressed concern that geothermal development around the Preserve may adversely affect the unique and world-class thermal features, the wildlife, the extraordinary landscape, and the recreation opportunities within the Preserve. Commenters also expressed concern that geothermal development around the

Preserve may affect local water supply, exacerbate costly and detrimental invasive species in the area, and increase the potential for earthquakes, which could prove catastrophic due to the large amounts of plutonium stored at the nearby Los Alamos National Laboratory. The comments from the American Indian tribes explained that the protection of the natural and cultural resources in the Preserve is vital for maintaining their traditional cultural practices, and specifically that the NPS's preservation of thermal features throughout the Preserve is necessary for the protection, preservation, and restoration of these resources and practices. For all of these reasons, the commenters supported the addition of the Preserve's thermal features to the list, which will result in increased information and consultation among the NPS, BLM, the Forest Service, and stakeholders prior to any leasing and development-related decisions in the area surrounding the Preserve, and therefore will enhance protection of the significant thermal features within the Preserve.

Only one commenter opposed the proposal, suggesting that the NPS should develop a geothermal power plant within the Preserve instead. This action, however, would be inconsistent with the purpose of the Preserve, the input from local and state communities, and applicable laws, regulations, and policies.

None of the commenters questioned the scientific underpinnings of the designation or the consistency of the features with the four significance criteria.

Consideration of Significance Criteria for Thermal Features Proposed

Caldera Thermal Feature

The entirety of the volcanic caldera that lies within the Preserve is hereby added to the list as one significant thermal feature. The Preserve's thermal feature is part of a geothermal landscape that extends beyond the Preserve's perimeter boundary, although thermal features located outside that boundary are not included. The magma chamber

beneath the Preserve is located under the southwest portion of the caldera, with surface expressions of thermal features primarily in the vicinity of Redondo Canyon, Sulphur Creek Canyon, and Alamo Canyon. Currently, approximately 1/3 of the Preserve has been surveyed. In addition, a detailed geologic and hydrologic GIS map has been developed. See http://geoinfo.nmt.edu/repository/data/2011/20110002/GM-79_mapsheet.pdf. (Fig. 5).

The subsurface heat that remains of the volcanic activity allows meteoric waters percolating down from the surface to become heated, which is expressed at the surface in several places within and in the vicinity of the caldera in the form of hydrologic hot springs or, in dry seasons, fumaroles or steam vents. The Preserve contains numerous thermal features (single or grouped contiguous features such as hot spring pools) in four geographic areas containing surface waters (Redondo Creek, Alamo Canyon, Sulphur Creek Canyon, and San Antonio Creek), as well as seasonal fumaroles and acid ponds or springs. These thermal features are also separately proposed for inclusion to the list as significant thermal (hydrothermal) features.

The NPS analyzed and determined that the following significance criteria are applicable to every component of the caldera feature and volcanic system within the Preserve.

(1) *Size, extent, and uniqueness:* The approximately 89,000-acre Preserve encompasses a 1.25 million year-old dormant volcanic caldera (13.7 miles in diameter) that lies in the center of the Jemez Mountains in northern New Mexico. The youngest post-caldera volcanic eruption (Banco Bonito Rhyolite lava flow) occurred about 68 thousand years ago. The Valles Caldera that formed 1.25 million years ago is the younger of two calderas within the Preserve, and lies to the southwest of the comparably sized but now nearly imperceptible Toledo Caldera (1.62 Ma). Each caldera produced about 95 mi³ (400 km³) of ash flow tuff collectively known as the Bandelier Tuff.

Numerous geothermal features occur throughout the Jemez Mountains. The Preserve does not encompass the entirety of the Valles Caldera depression itself—a portion of the northwestern caldera lies outside the boundary of the park unit to the west and south of the Preserve, in the Santa Fe National Forest. The subsurface volcanic heat anomaly or thermal system similarly extends outside of the park unit to the west.

(2) *Scientific and geologic significance:* Water, steam, and soil samples from these sites have been and continue to be collected by scientists conducting geothermal and planetary research, and by scientists searching for living organisms in extreme environments. Because of its geologic uniqueness, NPS staff will use this area for public education, as the site illustrates the exceptional geologic values of the Jemez Mountains—sulfuric acid fumaroles and mud pots, and chloride-bicarbonate hot springs and cold springs—all characteristics of geologically active volcanic formations.

(3) *The extent to which the feature remains in a natural, undisturbed condition:* The San Antonio Warm Springs and the Sulphur Springs-Alamo Canyon areas have been moderately to significantly disturbed by development (recreational structures, containment ponds, and other improvements as well as several geothermal exploration wells drilled between 1970-1984, most of which have been permanently capped and reclaimed) that occurred prior to federal acquisition of the Preserve in 2000; however, such alterations have not changed the thermal regime. Other features, such as acid ponds and fumaroles, are undisturbed in natural habitats. Despite some past geothermal exploration and drilling, the caldera itself as a volcanic feature remains unaffected in the operation of its volcanic thermal regime, and thus remains in a natural, undisturbed condition.

(4) *Significance to the authorized purposes for which the park unit was created:* The Preserve was established “to protect, preserve, and restore the fish, wildlife, watershed, natural, scientific, scenic, geologic, historic, cultural, archaeological, and

recreational values of the area” (P.L. 113-291, Sec. 3043(b)(1)). The caldera is an important natural, cultural, geologic resource, contributes to scientific understanding of the geology of the region, and also contributes to the other values for which this NPS unit was established.

Hydrothermal Features

Like Yellowstone National Park, which is also a caldera, the Preserve contains multiple hydrothermal features that are related to the magma source. In addition, the dynamic nature of this area means that additional hydrothermal features may develop over time. These thermal features (single or grouped contiguous features such as hot spring pools) occur in four geographic areas containing surface waters (Redondo Creek, Alamo Canyon, Sulphur Creek Canyon, and San Antonio Creek), as well as seasonal fumaroles and acid ponds or springs. These hydrothermal features are therefore also added to the list as one significant thermal feature. The NPS analyzed the following significance criteria for each feature listed and found them to be applicable to each feature within the system.

(1) *Size, extent, and uniqueness: Size* -- The hydrothermal features within the Preserve are located on approximately 500 acres.

Extent – (a) San Antonio Warm Spring is a single spring discharging potable hot water at 101°F, over which 20th-century ranchers built an enclosed concrete bath adjacent to a nearby cabin. This spring is located in the north-central portion of the Preserve adjacent to the segment of the San Antonio Creek within the Valle San Antonio.

(b) In addition, the Preserve has numerous hot and cold sulfuric acid fumaroles, particularly in the Alamo Canyon and Redondo Canyon regions. There are at least 29 fumaroles mapped in the Redondo and Alamo canyon areas; see map at:

http://geoinfo.nmt.edu/repository/data/2011/20110002/GM-79_mapsheet.pdf. Others may occur but have not been sampled or surveyed.

(c) The Sulphur Springs area contains the highest temperature hot springs (189°F) in the state of New Mexico; this area includes at least 7 significant named hot springs, mud pots and fumaroles, all of which are thermally anomalous; several other acid springs and gas vents are cold. The springs include such colorfully descriptive names as Kidney and Stomach Trouble Spring, Footbath Spring, Ladies' Bathhouse Spring, Laxitive [sic] Spring, Turkey Spring, Lemonade Spring, and Electric Spring. Some of these were historically referred to as Main Bathhouse Spring, Sour Spring, and Alum Spring.

(d) Valle Grande spring: The easternmost named spring within the Preserve is the Valle Grande Spring (14°C), although topographic maps indicate numerous other surrounding unnamed springs.

Uniqueness -- These springs and fumaroles (some of which take the form of bubbling mudpots in wet seasons) are indicators of subsurface thermal processes, are unique to the region, and are easily accessible for study and research; there are no comparable features in the State of New Mexico. The only other places in the United States that have such systems are Yellowstone National Park in Wyoming, Montana, and Idaho; Lassen Volcano, the Long Valley Caldera, and The Geysers in California, the latter two having thermal regimes degraded by geothermal production; and a very small system at Dixie Valley, Nevada.

(2) *Scientific and geologic significance*: Water, steam, and soil samples from these sites have been and continue to be collected by scientists conducting geothermal and planetary research, and by scientists searching for living organisms in extreme environments. Because of its geologic uniqueness, NPS staff will use this area for public education, as the site illustrates the exceptional geologic values of the Jemez Mountains—sulfuric acid fumaroles, mud pots, hot springs, cold springs—all characteristics of geologically active volcanic formations.

(3) The extent to which the feature remains in a natural, undisturbed condition:

San Antonio Warm Spring has been slightly to moderately disturbed by construction of recreational structures, such as a cabin and a small enclosed pool, that occurred prior to federal acquisition of the Preserve in 2000, but these were constructed to support the recreational use of the feature. However, such alterations have not changed the thermal regime. The overall hydrothermal system activity and temperature thus remain unchanged and in a natural, undisturbed state. The Sulphur Springs-Alamo Canyon areas were moderately to significantly disturbed by development (recreational structures, containment ponds, and other improvements as well as several geothermal exploration wells (drilled between 1970-1984); however, such alterations have not changed the thermal regime. Other features, including the Redondo Creek fumaroles (steam vents in dry season and mud pots or minor springs in wet seasons) are undisturbed in natural habitats. The overall hydrothermal system remains unchanged because it was never subjected to full-scale commercial development.

(4) Significance to the authorized purposes for which the unit was created:

While the enabling legislation for the Preserve does not specifically refer to hydrothermal features or their use by the public, the presence and preservation of such features as surface expressions of the subsurface volcanic activity is consistent with the Preserve's purposes and uses. The hydrothermal features are important natural, cultural, and geologic resources associated with the Preserve and the Jemez Mountains, contribute to scientific understanding of the geology of the region, and also contribute to the other values for which this system unit was established.

Conclusion: Because the Valles Caldera meets all four criteria as a volcanic feature, and because the hydrothermal system of the Preserve meets all four criteria as a hydrothermal feature, they are added to the list of significant thermal features in accordance with the GSA (see updated list in Figure 2).

The addition of the Preserve as a park unit with significant thermal features does not automatically prohibit geothermal leasing, development, or related activities in the area surrounding the Preserve. Instead, this action simply requires the NPS, BLM, USGS, and the U.S. Forest Service to work closely together and with other stakeholders to utilize available scientific, cultural, and other information to ensure that geothermal leasing, permitting, or development will not result in adverse effects on the significant thermal features of Valles Caldera National Preserve.

References

A list of references considered during this determination is available in the notice of proposal (81 FR 95632).

Fig.2. Updated List of Park Units Containing Significant Thermal Features. in

Accordance with Geothermal Steam Act, 30 U.S.C. 1026(a)

1. Aniakchak National Monument and Preserve (feature: Aniakchak Caldera (volcanic)).
2. Bering Land Bridge National Preserve (feature: Serpentine Hot Springs (hydrothermal)).
3. Big Bend National Park (including that portion of the Rio Grande National Wild and Scenic River located in the Park) (features: Spring No. 1 (hydrothermal), Spring No. 4 (hydrothermal), Hot Springs (hydrothermal)).
4. Crater Lake National Park (hydrothermal feature at bottom of lake).
5. Gates of the Arctic National Park and Preserve (feature: Reed River Hot Springs (hydrothermal)).
6. Haleakala National Park (feature: Haleakala Crater (volcanic)).
7. Hawaii Volcanoes National Park (features: Steaming Bluff and Sulpher Banks (hydrothermal), Kilauea Caldera and Halemaumau Crater (volcanic), Kilauea Iki Crater (volcanic), Great Crack and Southwest Rift (volcanic), East Rift Zone (volcanic), Chain of Craters (volcanic), Mauna Ulu (volcanic), Puu Oo (volcanic), Mokuaweoweo Caldera and Northeast Rift Zone of Mauna Loa (volcanic)).
8. Hot Springs National Park (feature: Hot Springs (hydrothermal)).
9. John D. Rockefeller, Jr. Memorial Parkway (feature: Huckleberry Hotsprings (hydrothermal)).
10. Katmai National Park and Preserve (feature: Novarupta and vicinity (volcanic)).
11. Lake Clark National Park and Preserve (features: Redoubt Volcano and Iliamna Volcano (volcanic)).
12. Lake Mead National Recreational Area (features: Black Canyon Hotsprings (hydrothermal), Blue Point Spring (hydrothermal), and Rogers Spring (hydrothermal)).
13. Lassen Volcanic National Park (feature: Lassen hydrothermal system including Bumpass Hell, Little Hot Springs Valley, Sulphur Works, Devils Kitchen, Boiling Springs Lake, Drakesbad Hot Springs, and Terminal Geyser)).
14. Mount Rainier National Park (features: Mount Rainier (volcanic), fumaroles at the summit of Mount Rainier and associated Ice Caves (hydrothermal), and Ohanapecosh Springs (hydrothermal)).
15. Valles Caldera National Preserve (features: Valles Caldera (volcanic) and hydrothermal system (hydrothermal)).
16. Wrangell-St. Elias National Park and Preserve (feature: Wrangell Volcanoes (volcanic)).
17. Yellowstone National Park (features: entire park including Old Faithful and approximately 10,000 geysers and hotsprings).

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Exercising the Delegated Authority of the Assistant Secretary
for Fish and Wildlife and Parks.
[FR Doc. 2021-06806 Filed: 4/1/2021 8:45 am; Publication Date: 4/2/2021]